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Abstract

Evaluation of Post-Incident Cooling Systems of Light Water Power Reactors

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Significance of post-incident cooling systems is evaluated in connection with so-called "maximum credible accident (MCA)" of light water power reactors.

In evaluation of a core spray system, non-uniformity of core spray flow distribution is taken into account. Introducing experimental data of core spray flow distribution and spray heat transfer, quantiative calculations are made of percentages of fuel segments ruptured in case of loss-of-coolant accidents. Calculations are made on JPDR (BWR, 12.5 Mwe) design data.

Stability criteria for spray cooling are also discussed. In evaluation of a container spray system, reduction factors of F.P. release are calculated, and relative significance of container spray systems is discussed.

In order to experimentally evaluate post-incident cooling systems (core spray, safety injection and container spray systems), Project SAFE (Safety Assessment and Facilities Establishment Project) has been established in Specialists Committee for Study on Nuclear Safety of Japan Atomic Industrial Forum. Specialists in various fields (universities, research laboratories and manufacturers) attend this Committee. During first period of this Project (from April 1963 to September 1964), amounts of flushed coolant at loss-of-coolant accidents are evaluated by a non-nuclear model, as well as temperature and pressure transients of a container. It is also aimed to run basic experiments on effects of types of spray nozzles and its arrangement, spray heat transfer and wash-out effect, for the purpose of comparing calculation results with experimental data. Experimental results obtained so far are reported.